

Annex B: Vulnerability Assessment

I. Purpose. To analyze the vulnerability of Cabarrus County to natural hazards that could threaten the county.

II. Situations and Assumptions.

A. Vulnerability to a natural hazard measures the extent to which people are expected to experience physical harm and the likelihood of property damage. Vulnerability to natural hazards exists both at the present and in the future. Present levels of development and growth generate conditions, which expose people and property to some degree of vulnerability to natural hazards. As an area experiences an increase or decrease in development and growth, that degree of vulnerability will change.

B. Information on past hazards and natural disasters will be presented as available. Most historic data will be available on a countywide basis only. When available, information will be presented for the County as a whole, for the County's planning jurisdiction

C. Inventory of Developed Facilities and Undeveloped Land. Table B-1 shows that total building value within Cabarrus County accounts for almost \$273 million worth of property improvements. All of these improvements are exposed to possible damage from future natural hazards although those within floodplains are the most likely to be affected by a future hazard event.

Table B-1: Value of Developed Facilities and Undeveloped Land in Cabarrus County

Developed Facilities and Land	# of Units	Acres	Building Value (in 000s)	Land Value (in 000s)	Total Tax Value (in 000s)
Residential Single Family	42,620	41,998.69	\$4,179,724	\$1,571,870	\$5,728,363
Multi-Family	10,406	864.423	\$408,411	\$112,480	\$400,644
Residential Subtotal	53,026	42,863.113	\$4,588,135	\$1,684,350	\$6,129,007
Exempt	209	2486.218	\$450,738	\$93,462	\$544,200
Commercial	4,709	5,484.606	\$936,925	\$608,305	\$1,569,129
Industrial	1,073	5,706.81	\$987,457	\$271,984	\$1,260,796
Agricultural	6,445	52,401.52	\$636,248	\$743,415	\$1,162,400
Other (Leased-developed)	473	939.88	\$192,020	\$53,805	\$20,537
Total Developed Facilities/Land	12,909	67,019.03	\$3,203,388	\$1,770,971	\$4,557,062
Undeveloped Acreage	0	44,312.56	\$0	\$1,337,595	\$1,069,415
Total Undeveloped Land	0	44,312.56	\$0	\$1,337,595	\$1,069,415
Total	65,935	154,194.7	\$7,791,523	\$4,792,916	\$11,755,484

Source: Cabarrus County Tax Assessor.

Notes

1. Areas listed include areas within municipal corporate limits and extraterritorial jurisdictions.
2. Total number of buildings does not equal addressable structures.
3. Total tax value excludes value of accessory and out buildings.
4. Exempt category includes religious, state, county, federal, city, railroads, subdivision lots not sold, subdivision common areas, clubs and lodges, cemeteries, water and sewer facilities, fire and rescue facilities, and recycling facilities.

D. Critical Facilities.

1. Critical facilities include those facilities that are necessary in the daily operation of a community and those that might be hazardous to a community. Certain critical facilities are vital to the response and recovery efforts in the wake of a disaster resulting from a natural or technological hazard. These include fire and rescue facilities, schools, hospitals, major thoroughfares and communication facilities. Cabarrus County has an extensive inventory of critical facilities as indicated in Table B-2 and shown on Map B-1. A map of these critical facilities is stored and maintained on file in the offices of the Cabarrus County Emergency Management Department. The ability to protect these facilities from damage is critical to the welfare of the communities in Cabarrus County in the wake of a future natural hazard event.

Table B-2: Critical Facilities in Cabarrus County

Type of Critical Facility	Number of Facilities						
	County Total	County Planning Jurisdiction	Concord	Kannapolis	Mt. Pleasant	Harrisburg	Midland
Law Enforcement	8	1	6	1	-	-	-
Fire Service	24	8	8	4	1	2	1
EMS	6	-	3	1	1	-	1
Rescue Squads	1	-	-	1	-	-	-
Government	18	2	7	9	1	1	1
Schools	40	3	19	12	3	1	1
Hazardous Materials Facilities (EHS)	16	-	7	5	-	2	1
Water Treatment Plant	3	-	2	1	-	-	-
Water Storage Tanks	8	1	6	1	-	-	-
Sewage Treatment Plant	2	2	-	-	-	-	-
Railroads	2	2	1	1	-	1	1
Major Highways	11	11	5	4	2	1	2
Major Bridges	42	8	23	5	1	4	1
Airports/Airfields	3	-	2	-	-	-	1

Source: Cabarrus County Commerce Department and Emergency Management Department

Notes:

1. Fire Service includes municipal and volunteer department stations.
2. Bridges are “major” if they are along principal highways or rail lines and damage or collapse would interdict the flow of traffic. NCDOT maintains and replaces all bridges listed above.
3. Hazardous Materials Facilities are only listed if rated as “Extremely Hazardous Substances” are stored/used at that site.
4. Airfields listed if paved/hard surface.

2. Critical Facility Replacement Value. Listed below is the replacement value for all those facilities located with the county jurisdiction and the municipalities of Mount Pleasant, Harrisburg, or Midland. If not included on this list, the facility is located in the cities of Concord or Kannapolis and will be addressed in their hazard mitigation plans

Table B-3: County Critical Facility Replacement Value

FACILITY	LOCATION	REPLACEMENT COST
Cabarrus County Governmental Center	65 Church Street Concord, NC 28025	13,102,631.00
Cabarrus County Court House (old)	85 Union Street S Concord, NC 28025	1,031,033.00
Cabarrus County Court House (new)	85 Union Street S Concord, NC 28025	7,343,205.00
Cabarrus County Sheriff’s Department and Jail	75 Union Street S Concord, NC 28025	2,101,455.00
Cabarrus County EMS Station 1	31 Willowbrook Drive Concord, NC 28025	340,352.00
Cabarrus County EMS Station 2	830 Hwy 49 S. Concord, NC 28025	289,970.00
Cabarrus County EMS Station 3	325 Jackson Street Mt. Pleasant, NC 28124	149,493.00
Cabarrus County EMS Station 4	777 Loop Road Kannapolis, NC 28081	450,000.00
Cabarrus County Sheriff’s Department Training Facility	4325 Irish Potato Road Concord, NC 28025	78,775.00
Cabarrus County General Services Complex	242 General Services Road Concord, NC 28025	6,001,960.00
Cabarrus County Arena and Event Center (County Logistics Receiving Point)	4751 Old Airport Road Concord, NC 28025	21,851,929.00
Cabarrus County Schools Administration Complex	4401 Old Airport Road Concord, NC 28025	4,001,162.00
Mount Pleasant Town Hall	1415 N. Main Street Mt. Pleasant, NC 28124	786,815.00
Harrisburg Town Hall	6450 Morehead Road Harrisburg, NC 28075	199,228.00
Midland Town Offices	Located with Midland VFD	-
A.T. Allen Volunteer Fire Department	4000 US Hwy 601 Concord, NC 28025	263,489.00
Coldwater Volunteer Fire Department	830 Gold Hill Concord, NC 28025	109,970.00
Flowes Store Volunteer Fire Department	8623 Flowes Store Road Concord, NC 28025	658,502.00

FACILITY	LOCATION	REPLACEMENT COST
Georgeville Volunteer Fire Department	6916 Hwy 200 Concord, NC 28025	394,058.00
Harrisburg Volunteer Fire Department, Station 1	6450 Morehead Road Harrisburg, NC 28075	598,480.00
Harrisburg Volunteer Fire Department, Station 2	9045 Rocky River Road Harrisburg, NC 28075	410,697.00
Jackson Park Volunteer Fire Department	36 Green Street Concord, NC 28025	259,641.00
Midland Volunteer Fire Department	12805 US Hwy 601 S Midland, NC 28107	245,670.00
Mt. Mitchell Volunteer Fire Department	5875 Old Salisbury-Concord Road Kannapolis, NC 28081	496,935.00
Mt. Pleasant Volunteer Fire Department	1415 N. Main Street Mt. Pleasant, NC 28124	439,627.00
Northeast Cabarrus Volunteer Fire Department	1530 Lentz Harness Shop Road Mt. Pleasant, NC 28124	545,398.00
Odell Volunteer Fire Department	9051 Davidson Highway Concord, NC 28027	453,332.00
Rimer Volunteer Fire Department	2709 Rimer Road Concord, NC 28025	421,545.00
Cabarrus Rescue Squad	2900 S. Main Street Kannapolis, NC 28081	286,049.00

III. Present Vulnerability

A. There are many considerations in determining the overall vulnerability of a community or area. These include vulnerable populations, high-risk areas, and vulnerable structures and facilities. Vulnerable populations are identified as those highly populated areas that are most susceptible to natural or technological hazards. Cabarrus County has several areas of vulnerable populations, most of which are located in the 100-year floodplains of the Rocky River and other major drainage ways. (These areas are identified on Map B-2, Cabarrus County Areas Vulnerable to Flooding.)

B. In 1997, there were 210 structures located in the 100-year floodplains within unincorporated Cabarrus County. Using the 1998 Special Census occupancy rate of 85% and average household size of 2.6 persons/household, an estimated 465 persons were residing within the 100-year floodplain in 1997.

Table B-4: Building Permits for Cabarrus County Permitting Jurisdiction*
January 1993 – December 2009

Structure Type	Outside Floodplain	Inside Floodplain	% of Total Permits in Floodplain	Total Permits
Site-Built	27713	143	.51	27856
Manufactured	4930	17	.34	4947
Subtotal	32643	160	.49	32803
Non-Residential (church, school, office, etc.)	12609	34	.27	12643
Total	45252	194	.43	45446

Source: Cabarrus County Commerce Department

Note: Cabarrus County Permitting Jurisdiction includes the unincorporated portions of the County and the municipalities of Concord, Harrisburg, Midland, Mount Pleasant, and the Cabarrus County portion of Kannapolis.

C. As indicated in Table B-4, of the total 45,252 building permits issued in the past sixteen years, 194 or 0.43% were issued for structures constructed or placed within the 100-year floodplain. Applying this ratio to the existing \$7.79 billion building value tax base (buildings only), indicates that approximately \$31,945,244 worth of property improvements within the Cabarrus County permitting jurisdiction are currently susceptible to property damage from a flood hazard event. The increased frequency and intensity of natural hazard events over recent years indicates high vulnerability for Cabarrus County populations and structures.

D. As indicated in Table B-4, 0.49% of the total 32,643 residential building permits issued in the last sixteen years were issued for structures constructed or placed in the 100-year floodplain. Applying this ratio to the current residential tax base of \$6.13 billion (Cabarrus County permitting jurisdiction), would indicate over \$25,128,928 worth of residential property (land and buildings) is currently susceptible to flooding. The future vulnerability to flooding will remain high even if no additional development occurs within flood hazard areas.

E. National Flood Insurance Program. The National Flood Insurance Program (NFIP) provides insurance coverage for flood susceptible properties. Cabarrus County has participated in the NFIP under emergency status since July of 1975 and gained full status in May of 1981. Data on current NFIP insurance policies and recent claims are shown in Table B-5. The data shows a very large increase in the number of policies and the values associated with those insured properties. This increase is more attributable changes in the lending industry and requirements imposed by those lenders than additional construction in vulnerable areas. Lending institutions have employed improvements in mapping to determine structures that may be vulnerable and have required the owners of those existing structures to obtain flood insurance.

Table B-5: National Flood Insurance Program Statistics for Cabarrus County

Category	Number or Value	
	Unincorporated Areas	Harrisburg, Midland and Mt. Pleasant
Flood Insurance Policies	244	68
Total Insured Value	\$62,447,200	\$12,177,400
Total Premiums	\$101,781	\$26,762
NFIP Substantial Claims Since 1978*	76	41
NFIP Claims Since 1978	31, total value \$1,613,582	16, total value \$632,626
Total Repetitive Losses	6	3
Total Repetitive Loss Payments	\$165,026	\$55,250

Source: North Carolina Division of Emergency Management.

* Substantial Claims indicate damage greater than 50% of current market value

F. Repetitive Loss Data - There are 9 cases of repetitive losses in the unincorporated County and Harrisburg for a total value of \$220,276 (see Table B-5). There are currently nine structures identified as repetitive loss areas. These repetitive loss areas are residential properties with a majority of the cost related to structural loss.

G. Future Vulnerability

1. Future vulnerability is defined as the extent to which people are expected to experience harm and property damage by a hazard event if projected development were to occur. Vulnerability will increase significantly if development occurs in areas susceptible to adverse impacts from natural hazards. In response Cabarrus County, Harrisburg, Mt. Pleasant and Midland all made changes to their Flood Damage Prevention Ordinances to limit fill in flood plains. This action will preserve the natural storage capacity of those areas for flood waters and reduces the number of structures built in susceptible areas.

2. According to the 2000 Census of Population and Housing, the annual population growth rate for Cabarrus County from 1990-2000 was 32.5%. Over that same time period, the number of housing units within the County increased from 39,713 to 52,848 (Table B-6).

Table B-6: Cabarrus County Housing Unit Growth

1990 Census	2000 Census	Increase in Units	Percent Increase
39,713	52,848	13,135	33.07

*Source: 1990, 2000 Census of Population and Housing. Countywide, including all incorporated municipalities.

2010 Population Projection	2015 Population Projection	Increase in Units	Percent Increase
73,376	86,409	13,033	17.76

*Source: NC Office of State Budget and Management

3. According to the Cabarrus County Commerce Department, 32,748 new residential permits were issued within the County's permitting jurisdiction from January 1993 to December 2009. Of these, 5% (five tenths of one percent) were for properties located in the 100-year floodplain

The NC Office of State Budget and Management projects a substantial increase in population than the Cabarrus County Commerce Department. The State Demographer's estimate is based on the rapid residential growth Cabarrus County experienced since the 2000 Census, but that growth has curtailed dramatically with the economic downturn. Based on County growth projections, it is estimated there will be an additional 38 housing units constructed in flood prone areas.

4. Applying the 2000 Census of Population and Housing average household size of 2.50 persons/unit to these 38 new residential units would indicate that 95 additional persons could be in harm's way during flooding if no changes are made in current housing development patterns within the County's permitting jurisdiction.

Table B-7: Future Flood Vulnerability
Current Residential Growth Patterns within County Permitting Jurisdiction

Number of Residential Building Permits		Number of Residential Building Permits in Floodplain		Number of Persons Exposed to Flood Hazard	
1993-2009	2010-2020 Projected	1993-2009	2010-2020 Projected	1993-2009 Estimated Increase	2010-2020 Projected Increase
32,748	7,223	160	38	400	95

Source: Cabarrus County Commerce Department.

5. Any increase in susceptibility to flooding cannot be allowed to occur. The County and municipalities have made changes to their plans and ordinances so that future growth and development is encouraged in areas of low vulnerability. These plans and ordinances encourage growth in areas currently equipped to handle increased density. Whenever possible they recommend and even require open space and recreational uses as appropriate uses in flood prone areas. By consistently implementing existing and new land use policies and regulations as proposed in the hazard mitigation plan, future vulnerability will be reduced. Strict enforcement of mitigation measures such as adherence to the Flood Damage Prevention Ordinance and the Unified Development Ordinance (where applicable) must be utilized to decrease vulnerability to hazards.

6. The data shown in Tables B-6 and B-7 are derived from calculations based on the assumption that prior trends in development will prevail. The economic downturn and current County ordinances have altered that trend and will significantly reduce these projected figures. Based on currently available information, future damage costs are estimated between 100,000 and 200,000 dollars.

H. Redevelopment - Planning for redevelopment in the wake of a natural disaster also serves to reduce future vulnerability. Redevelopment should be encouraged in a manner which will result in lower vulnerability by restricting re-building within high-risk areas and requiring the use of mitigation measures in the rebuilt structures, such as higher finished floor elevations and flood-proofing. These measures are currently being regulated through Cabarrus County's Flood Prevention Ordinance. This document is enforced through resolution by the towns of Midland, Mount Pleasant, and Harrisburg.

I. Urbanization.

1. The level of general development in unincorporated areas of Cabarrus County is not expected to contribute appreciatively to a rise in the height of general flooding, however, continued residential and commercial development along the Rocky River may contribute to higher levels of flooding in future years. As municipalities within Cabarrus County continue to grow, flash flood levels within small drainage basins are expected to increase significantly if mitigation measures such as on-site storm water retention are not required.
2. Another significant problem with increasing urbanization is the reduced amount of time between the rainfall event and the actual flooding. Without mitigation, urbanization increases the likelihood of flash floods, increases the land susceptible to flooding, and reduces warning time for evacuation of susceptible populations.

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